Author’s response to reviews

Title: ITEMAS Ontology for Healthcare Technology Innovation

Authors:

Alberto Moreno-Conde (alberto.moreno.sspa@juntadeandalucia.es)
Carlos Luis Parra-Calderón (carlos.parra.sspa@juntadeandalucia.es)
Silvia Sánchez-Seda (silviaseda@gmail.com)
Germán Antonio Escobar-Rodríguez (gantonio.escobar.exts@juntadeandalucia.es)
Marta López-Otero (mlopez4@imim.es)
Lorena Cussó (lcusso@hggm.es)
Raquel del-Cerro-García (raquel.delcerro@semicrol.com)
Manuel Segura-Sánchez (msegura@fcsai.es)
Laura Herrero-Urigüen (innovacion2@idival.org)
Nuria Martí-Ras (nmarti@igt.cat)
Marta Albertí-Ibarz (malberti@idom.com)
Manuel Desco (desco@hggm.es)

Version: 2 Date: 04 Mar 2019

Author’s response to reviews:

Authors want to thank you for the review and comments made to the original manuscript. Next we include explanations about how were addressed each of the reviewer comments.

Reviewer #1
I think this is a very relevant article. The research shown tries to define a very clear methodology in order to set up the ontology.
My only 2 minor comments are:
- I would like to have more details about the consensus process.

The manuscript was upgraded including description about how long were these tasks, and how there were performed the work of team members and ontology editors:
Task 1: Identification of concepts: During the first two months period, the UNE 166000 standard and ITEMAS indicators document were divided into several sections, each of which was assigned to a working team (working teams comprised 2 people, with a total of 5 working teams participating in this task). Each month, every team member received their assigned sections and spent a period of 15 days for identifying those concepts candidate to be included in the ontology. Working teams determined the priority level of each concept to be included in the ontology. Ontology editors collected the identified terms in a spreadsheet and reviewed the level of consensus between multiple members of a team. In those cases were no agreement was reached between the members of a team, a designated ontology editor (from the group of 3) proposed the priority level in consensus with the previous working team.

Task 2: Conceptualization and formalization: For 5 months ontology editors proposed definitions for each concept and established their semantic relationships with other concepts included in the ontology. Every month the concept definitions and relationships proposed were reviewed for 15 days by team members in an iterative process until all of the working teams had reached a consensus.

In addition, there were included more details in the results section about how the consensus process was carried out:

The editors divided the UNE 166000 standard [14] into sections that were assigned to the reviewers, who identified 65 candidate concepts to be included in the ontology. All these concepts were included in a spreadsheet and reviewed during a teleconference with team members and ontology editors. With consensus between editors and reviewers, all concepts were classified into 3 levels—high, medium, and low—based on their relevance for the scope of the ontology. The 44 concepts classified as being of high or medium relevance were included in the ontology. The same process was applied to the ITEMAS innovation indicators, thus leading to the identification of 145 candidate concepts, from which 70 were considered sufficiently relevant to be included in the ontology after their revision in a teleconference with team members and ontology editors.

- About the people participating in the research I would like to have more information such as: have they participated in any innovation or implementation of innovation process?

All the 13 members participating in this research as ontology editors or reviewers have involved in the implementation of innovation processes, as part of the innovation units of the ITEMAS centers. Also, they have participated in the development and implementation of innovations. Platform ITEMAS has developed and implemented a Best Practices Guide in healthcare innovation management, that has been published and shared among ITEMAS member, collaborators and different institutions involved somehow in healthcare innovation (government agencies, companies, research centers, etc.).

The objective of this guide is to facilitate the implementation of an innovation model that complies with the Spanish regulation and the norm for innovation management. It includes aspects such as: Defining a strategy, fostering a culture for innovation, innovation process, and measurement.
When you ask about years of experience, to what experience do you refer?

We refer to R&D&I experience this covers promotion of innovation culture, R & D execution, innovation management and market transference.
In order to clarify this point, we have updated the manuscript including the text “Experience in R&D&i“ in the table 1.

finally I would like to have more details about how this ontology will be implemented.

In the discussion section there were explained how the ontology will be applicable to establish a map of agents and knowledge to show the capabilities and projects of the Spanish healthcare system. There were included additional information for clarify the importance of these services in bold

ITEMAS intends to create a map of agents and knowledge to show the capabilities and projects of the Spanish healthcare system, as well as the services provided by its participating centers. The ontology could be applied to match needs with existing projects and capabilities from the community of organizations interested in Healthcare Technology Innovation (HTI). As a result, this ontology is expected to contribute to the promotion of new collaborations and innovation initiatives between members of the ITEMAS network. The ontology will be the cornerstone for future services that will establish relationships between multiple actors involved in the innovation process with the results. Data collected through the ITEMAS portal and provided by members will be applied to identify and highlight best practice in the HTI field.

Reviewer #2:
The authors use an Information Science approach to ontology with the purpose of organizing information, data and other sources of knowledge within the ITEMAS initiative. The ultimate aim is, I understand, the efficient self-management of information and the development of some systematic system that would assist in such objective.

I believe that the ITEMAS initiative in Spain (as a whole) is of real interest to other countries and settings, but the paper focusses on a rather methodological issue the ITEMAS network has developed. The final outcome seems to be a set of agreed definitions on concepts (which the authors do not provide), in a hierarchical manner and, I guess, then translated into English for publication purposes.

The original manuscript already explained that ITEMAS ontology was made available through the bioportal website. The reference has been updated to make easier for readers find this ontology.

There is merit in reaching some consensus among different stakeholders or potential users regarding a given set of new concepts and the subsequent relationships among them. No doubt about that. However, the authors should take a reader perspective and try to communicate the
value of such experience by answering some of the following questions:

How replicable is this initiative in other contexts (beyond ITEMAS in Spain)?

The manuscript already explained that our work addressed needs beyond the Spanish border and at global level.

Although the ITEMAS ontology is led by Spanish healthcare centers, it also addresses a need existing at international level since HTI is an area of global relevance. On one hand, ITEMAS is growing beyond Spanish border, since healthcare centers from Spanish-speaking countries such as Colombia and Venezuela have already joined the network. On the other hand, it is expected that translations of the ontology to other languages could be applicable to healthcare centers at global level.

Moreover, it is precisely the high-level conceptualization based on ontologies that allow the extension/modification of the conceptual model to adapt it to other contexts.

How useful for other countries/setting are the findings?

There were included additional explanation about the benefits for their local settings:

Healthcare centers and actors involved in HTI will be able to obtain a consistent management of information based the defined concepts and its relationships that will allow to. Moreover, translated versions of the ITEMAS ontology concepts could provide an opportunity for cross-border collaboration with companies and hospitals from different countries. This is especially relevant nowadays with the globalization of the healthcare market. In this regard, the European Commission is working towards the establishment of a Digital Single Market across the multiple European Member States.

How evolving is the topic (new concepts emerging and others being redefined) which may force a continuous update?

Although a maintenance task was established to ensure that the ontology was updated with emerging concepts that might arise on the daily use, the manuscript already stated that concepts included in the ontology have been applied for many years. In the discussion section we added a clarification about how to affect the lifecycle of the standard.

The ontology is aligned with the best practices in innovation management, since the concepts addressed have been applied for many years. They have therefore reached an appropriate level of maturity and have been homogenized according to applicable standards for innovation management. Since the most of concepts of ITEMAS ontology were extracted from the UNE 166000 standard, it is expected that core concepts of the ontology will remain persistent for several years (standards have a review cycle every 5 years).

The description of the maintenance task has been updated.

- Task 5: Maintenance: A maintenance task was established every year to ensure that the
ontology was updated with emerging concepts identified with daily use of the ontology.

I honestly think the reader would find little interest in such a paper if he/she cannot find a useful connection to his/her own setting.

We expect that updated manuscript improved with additional details about the evolution of concepts, the international dimension and how useful is the ontology for other countries/settings will allow readers to establish connections between the presented work with their individual reality.

Reviewer #3: The paper provides the results of a research effort focusing on the definition of a formal representation of the most relevant concepts associated with the creation and adoption of innovative medical technology in the Spanish healthcare system. Specifically, the defined ontology describes how relationships between employees, organizations, projects, and ideas can be applied to generate results that are transferable to the market, general public, and scientific forums.

The proposed approach builds on the added value (and data) provided by the regional network of 66 healthcare centers (ITEMAS), focusing on fostering innovation in medical and health technologies.

The methodology is convincingly based on the methontology process, with peer review identification and selection of concepts from the innovation indicators used by the ITEMAS and innovation management system standards, followed by an iterative validation process. The proposed approach allows the system to carry out the involved sequence of tasks and its associated functionality and managed clinical data. The proposed semantic model constitutes also the main pillar for enabling dynamic service selection.

The research presented in the paper is innovative as it defines an ontology for innovation focused on healthcare centers in Spain, describing how relationships between employees, organizations, projects, and ideas can be applied in a large scale to generate results that are transferrable to the market, general public, and scientific forums.

It might be scaled up to other healthcare systems, providing standards that guide organizations in the introduction, development, and maintenance of frameworks for systematic innovation management practices, and positively impacting the scale up of innovations to benefit of citizens. The paper is acceptable in its present format.

Authors have nothing else to add.